

Claims:

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1. A dose setting device for use in combination with a fluid-filled reservoir, the dose setting device being adapted for repetitive injection of individually set doses of fluid from the reservoir, the dose setting device comprising:
 - a housing (10),
 - a drive member (30) adapted to expel a dose of medicine from the reservoir,
 - 10 - a spring means (70),
 - a dose setting assembly (40, 50, 60) mounted in the housing and connected to the spring means, the dose setting assembly comprising a dose setting member (50) being moveable in a first direction to a selected set position against the bias of the spring means, wherein movement of the dose setting member is accompanied by straining of the spring, and wherein the dose setting member is moveable in a second direction to selectively adjust the set dose,
 - 15 - a latch means (80, 90) associated with the housing to retain the apparatus in the set position against the bias of the spring means, and
 - the latch means being releasable to cause the drive member to expel the set dose from the syringe, the force for expelling the set dose being provided by the spring means.
 2. A dose setting device as defined in claim 1, wherein the dose setting assembly further comprises a coupling member (60) in displaceable engagement with the dose setting member, the spring means acting on the cou-

pling member, the coupling member acting on the dose setting member (50).

3. A dose setting device as defined in claim 2,
5 wherein the dose setting member (50) and the coupling member (60) comprise mutually cooperating surfaces (54, 62) providing a coupling therebetween such that movement of the dose setting member in order to set a dose results in straining of the spring means.

10 4. A dose setting device as defined in claim 3,
wherein one of the dose setting member (50) and the coupling member (60) is rotationally mounted on the drive member, the other being arranged in sliding, non-
15 rotational engagement with the drive member.

5. A dose setting device as defined in claim 4,
wherein the dose setting member (50) is rotationally mounted on a threaded portion of the drive member whereby
20 selectively setting a dose results in an axial movement of the dose setting member relative to the drive member, and the coupling member (60) is arranged in sliding, non-rotational engagement with the drive member, the spring means acting on the coupling member in a direction corresponding to the longitudinal axis of the drive member.

25 6. A dose setting device as defined in claim 5,
wherein the threaded connection between the dose setting member and the drive member is of the non-locking type,
30 and wherein the coupling (54, 62) between the dose setting member and the coupling member allows the dose setting member to be rotated in either direction, yet pre-

venting the spring means to counter rotate the dose setting member.

7. A dose setting device as defined in any of
5 claims 4-6, wherein the coupling (54, 62) is arranged between the cooperating surfaces of the dose setting member (50) and the coupling member (60), the coupling providing a resistance against rotation which is sufficiently to prevent the spring means to counter rotate the dose setting member, the resistance being easily overcome by a user rotating the dose setting member in either direction, whereby a user can selectively increase or decrease a dose setting.

15 8. A dose setting device as defined in any of
claims 2-7, further comprising a threaded member (20)
with a first internal thread, the drive member being a longitudinal drive member (30) having an external thread (31) corresponding to the first internal thread, the
20 threads being non-locking having a pitch angle whereby axial movement of the drive member is obtained by an axial force applied to the drive member by the spring means.

25 9. A dose setting device as defined in claim 1,
further comprising a threaded member (20) fixed in the housing and comprising a first internal thread, the drive member being a longitudinal piston drive member (30) having an external thread (31) corresponding to the first
30 internal thread, the threads being non-locking having a pitch angle whereby axial movement of the piston drive member is obtained by an axial force applied to the piston drive member by the spring means.

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10. A dose setting device as defined in claim 9,
wherein the dose setting member (50) comprises a second
internal thread (53), the dose setting member being rota-
5 tionally mounted on the external thread (31) of the pis-
ton drive member, whereby selectively setting a dose re-
sults in an axial movement of the dose setting member re-
lative to the piston drive member.
- 10 11. A dose setting device as defined in claim 10,
wherein the dose setting assembly further comprises a
coupling member (60) arranged in sliding, non-rotational
engagement with the piston drive member, the spring means
acting on the coupling member in a direction correspond-
15 ing to the longitudinal axis of the drive member, the
coupling member acting on the dose setting member (50).
- 20 12. A dose setting device as defined in claim 11,
wherein the dose setting member (50) and the coupling
member (60) comprise mutually cooperating surfaces (54,
62) providing a coupling therebetween such that rotation
of the dose setting member in order to set a dose results
in straining of the spring means as the coupling member
is driven backwardly.
- 25 13. A dose setting device as defined in claim 12,
wherein the threaded connection between the dose setting
member and the piston drive member is of the non-locking
type, and wherein the coupling (54, 62) between the dose
30 setting member and the coupling member allows the dose
setting member to be rotated in either direction, yet
preventing the spring means to counter rotate the dose
setting member.

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14. A dose setting device as defined in claims 12 or
13, wherein the coupling (54, 62) is arranged between the
cooperating surfaces of the dose setting member (50) and
5 the coupling member (60), the coupling providing a resis-
tance against rotation which is sufficiently to prevent
the spring means to counter rotate the dose setting mem-
ber, the resistance being easily overcome by a user ro-
tating the dose setting member in either direction,
10 whereby a user can selectively increase or decrease a do-
se setting.
15. A dose setting device as defined in any of
claims 12-14, wherein the coupling between the dose set-
15 ting member and the coupling member is provided by cou-
pling parts having surfaces provided with sector shaped
teeth (54, 62) having ramp shaped edges, the surfaces be-
ing forced against each other with the ramp shaped edges
of the teeth on one surface abutting the ramp shaped
20 edges of the teeth on the other surface, such that when
the dose setting member is rotated in either direction,
the teeth on the coupling parts will slide with their
ramp shaped parts over each other, whereby the dosing
member is axially displaced against the force of the
25 spring and will jump back each time a top of the teeth is
reached, the pitch of the toothing preferably being cho-
sen so that a jump back takes place each time the dose
setting is increased by a given dose unit.
- 30 16. A dose setting device as defined in any of
claims 12-14, wherein the coupling is a frictional cou-
pling provided between the cooperating surfaces, the nec-

essary compression force between the surfaces being provided by the spring means acting on the coupling member.

17. A dose setting device as defined in claim 12 or
5 13, wherein the coupling can be selectively engaged and
disengaged allowing the dose setting member to be rotated
in either direction.

18. A dose setting device as defined in claim 17,
10 wherein the coupling is an one-way ratchet mechanism comprising first and second ratchet members (125, 126) and which can be disengaged by relative axial movement between the first and second ratchet members.

15 19. A dose setting device as defined in any of the previous claims, wherein the latch means (80, 90) acts on the drive member.

20. A dose setting device for use in combination
20 with a fluid-filled reservoir, the dose setting device being adapted for repetitive injection of individually set doses of fluid from the reservoir, the dose setting device comprising:

- a housing (108),
- 25 - a drive member (102) adapted to expel a dose of medicine from the reservoir in the syringe,
- a spring means (106),
- a dose setting assembly (101, 103) mounted in the housing and connected to the spring means, the dose setting assembly comprising a dose setting member (101) and a driving member (103) coupled to each other, the dose setting member being moveable in a first direction from an initial position to a selected set position

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against the bias of the spring means, wherein movement of the dose setting member is accompanied by straining of the spring means,

- a first latch means (109) associated with the housing to retain the device in the set position against the bias of the spring means,

- the first latch means being releasable to cause the drive member to expel the set dose from the syringe, the force for expelling the set dose being provided by the spring means, and

- wherein the coupling is adapted to be selectively disengaged thereby allowing the dose setting member to be moved in a second direction to selectively adjust the set dose.

21. A dose setting device as defined in claim 20 comprising a second latch means (119) associated with the housing to retain the dose setting member in its coupled position,

- the second latch means being releasable to allow the dose setting member to disengage from the driving means (103).

22. A dose setting device as defined in claim 20 or 21 wherein the spring means (106) is strained torsionally thus providing a rotating force on the dose setting member.

23. An injection device for repetitive injection of individually set doses of a fluid from a reservoir, comprising:

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- a body adapted for receiving a cartridge containing a fluid to be injected, the cartridge defining the reservoir and containing a piston, and
- a dose setting device as defined in any of the previous claims, the drive member acting on the piston in order to expel fluid from the cartridge.

24. An injection device for repetitive injection of individually set doses of a fluid from a reservoir, comprising:

- a body comprising a reservoir containing a fluid to be injected, the reservoir containing a piston, and
- a dose setting device as defined in any of the previous claims, the drive member acting on the piston in order to expel fluid from the reservoir.

25. A method for infusing a flowable drug into a living subject is provided, comprising the steps of:

- providing an injection device for repetitive injection of individually set doses of a drug from a reservoir, the injection device comprising a housing, a reservoir containing a drug to be injected and having an outlet means therefore, a drive member adapted to expel a dose of medicine from the reservoir, a spring means, a dose setting assembly mounted in the housing and connected to the spring means, the dose setting assembly comprising a dose setting member being moveable in a first direction to a selected set position against the bias of the spring means, wherein movement of the dose setting member is accompanied by straining of the spring, and wherein the dose setting member is moveable in a second direction to selectively adjust the set dose, a latch means associated with the housing to retain the injection

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device in the set position against the bias of the spring means, and the latch means being releasable to cause the drive member to expel the set dose from the reservoir, the force for expelling the set dose being provided by the spring means, the method comprising the further steps of:

- establishing a flow connection between the outlet means and the subject,

- selecting a dose by operating the dose setting member, and

- releasing the latch means to cause the drive member to expel the set dose of drug from the reservoir.

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